

## **What is claimed is:**

**[Claim 1]** 1. A process for depositing silicon nitride films on wafers, comprising:

providing a chemical vapor deposition (CVD) system comprising a tubular furnace, at least one BTBAS (bis t-ButylaminoSilane) supply piping line connected to a base portion of said tubular furnace, an exhaust piping line connected to an upper portion of said tubular furnace, a bypass line connecting said BTBAS supply piping line with said exhaust piping line, and a vacuum pump connected to said exhaust piping line, wherein said bypass line is initially interrupted;

placing a batch of wafers into a tube of said tubular furnace;

flowing nitrogen-containing gas into said tube;

flowing BTBAS into said tube through said BTBAS supply piping line and said vacuum pump maintaining pressure in said tube in a range of between about 0.1 Torr and 3 Torr;

performing a silicon nitride deposition process in said tube to deposit a BTBAS-based silicon nitride film on said wafers;

upon completion of said silicon nitride deposition process, interrupting said BTBAS supply piping line and opening said initially interrupted bypass line; and

removing said batch of wafers.

**[Claim 2]** 2. The process for depositing silicon nitride films on wafers according to claim 1 wherein after removing said batch of wafers, the process further comprises flowing cleaning gas into said tube.

**[Claim 3]** 3. The process for depositing silicon nitride films on wafers according to claim 2 wherein said cleaning gas comprises  $\text{ClF}_3$ .

**[Claim 4]** 4. The process for depositing silicon nitride films on wafers according to claim 2 wherein said cleaning gas comprises  $\text{NF}_3$ .

**[Claim 5]** 5. The process for depositing silicon nitride films on wafers according to claim 1 wherein by opening said initially interrupted bypass line upon completion of said silicon nitride deposition process, said BTBAS remaining in said BTBAS supply piping line is evacuated through said bypass line without entering said tubular furnace, thereby eliminating particle problems.

**[Claim 6]** 6. The process for depositing silicon nitride films on wafers according to claim 1 wherein said nitrogen-containing gas comprises ammonia gas.

**[Claim 7]** 7. The process for depositing silicon nitride films on wafers according to claim 1 wherein silicon nitride deposition process is carried out at a temperature of between 450~600°C.

**[Claim 8]** 8. The process for depositing silicon nitride films on wafers according to claim 1 wherein said BTBAS is flowed into said tube at a flow rate of about 25~500 sccm.

**[Claim 9]** 9. The process for depositing silicon nitride films on wafers according to claim 1 wherein said nitrogen-containing gas is flowed into said tube at a flow rate of about 50~1000 sccm.

**[Claim 10]** 10. A chemical vapor deposition (CVD) furnace system for performing a silicon nitride deposition process on wafers, comprising:  
a tubular furnace comprising a tube for accommodating a batch of wafers;  
at least one BTBAS (bis t-ButylaminoSilane) supply piping line connected to a base portion of said tubular furnace;

an exhaust piping line connected to an upper portion of said tubular furnace;

a bypass line connecting said BTBAS supply piping line and said exhaust piping line; and

a vacuum pump connected to said exhaust piping line, wherein said bypass line is initially interrupted, and upon completion of said silicon nitride deposition process, said BTBAS supply piping line is interrupted and said initially interrupted bypass line is opened.

[Claim 11] 11. The CVD furnace system for performing a silicon nitride deposition process on wafers according to claim 10 wherein said tube is made of quartz.

[Claim 12] 12. The CVD furnace system for performing a silicon nitride deposition process on wafers according to claim 10 wherein said silicon nitride deposition process is carried out under a pressure in a range of between about 0.1 Torr and 3 Torr.

[Claim 13] 13. The CVD furnace system for performing a silicon nitride deposition process on wafers according to claim 10 wherein said silicon nitride deposition process is carried out at a temperature of between 450~600°C.

[Claim 14] 14. The CVD furnace system for performing a silicon nitride deposition process on wafers according to claim 10 wherein said bypass line is interrupted by means of a control valve.

[Claim 15] 15. The CVD furnace system for performing a silicon nitride deposition process on wafers according to claim 10 wherein by opening said initially interrupted bypass line upon completion of said silicon nitride deposition process, said BTBAS remaining in said BTBAS supply piping line is

evacuated through said bypass line without entering said tubular furnace, thereby eliminating particle problems.